

High Winds.—Winds of 50 miles and over were reported as follows: On summit of Mt. Washington, 1st to 3rd, 8th to 28th; on five of these dates the wind reached a velocity of 100 miles per hour; maximum wind velocity of 110 miles SE. on the 12th. On summit of Pike's Peak, 1st, 2nd, 4th, 11th, 12th, 15th, 16th, 20th, 21st, 26th to 28th; maximum wind velocity 80 miles W. on the 21st. Umatilla, 55 W., 25th. Ft. Shaw, Mont., 50 SW., 1st. Moorehead, Minn., 62 SE., 4th. Sandusky, 64 NE., 1st. Indianola, 51 N., 11th. New Orleans, 52 SE., 6th. Mobile, 60 SE., 6th. Portsmouth, N. C., 52 NW., 1st. Kitty Hawk, 52 N., 1st. Delaware Breakwater, 58 S., 12th. Cape May, 55 NW., 16th. Wood's Holl, 52 SE., 28th.

Local Storms.—During the passage of low-area No. VI northeastward over Tennessee and the Ohio valley on the 18th, opposing northerly and southerly winds, accompanied by high contrasts of temperature, prevailed in the southwest quadrant; the latter ranging from 35° to 45° between southern Illinois and the central portion of Alabama and Mississippi. Under these peculiar atmospheric conditions there occurred, quite late in the day and within the central portion of Alabama, a terrific tornado, which passed over a part of Tuscaloosa county. Its path extended from southwest to northeast, a distance of about 15 miles, and was characteristically narrow. The storm cloud, as usual, was accompanied by a loud roaring noise and a rotary motion from right to left. Several persons reported in connection with the passage of the cloud the presence of large balls of fire which sparkled and flashed in the belt of the wind, and seemed to be of all sizes, from the dimensions of an egg up to that of a half-bushel measure. Hail and rain followed in the track of the storm. The largest trees were twisted off near the stump or violently uprooted, and over twenty buildings were either unroofed or demolished. Heavy objects were conveyed long distances and the debris of buildings and fences was invariably carried from the east around by the north to the west, and thence by the south to the east. This storm passed but a little south and east of the track of many previous tornadoes which have traveled across this portion of the State in the same general direction.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for February, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verification to be 88.2 per cent. The percentages for the four elements are: Weather, 90.2; Direction of the Wind, 85.5; Temperature, 89.9; Barometer, 87.1 per cent. By geographical districts they are: for New England, 87.9; Middle States, 90.9; South Atlantic States, 92.2; Eastern Gulf States, 87.9; Western Gulf States, 91.1; Lower Lake region, 84.7; Upper Lake region, 87.5; Tennessee and the Ohio valley, 88.8; Upper Mississippi valley, 84.9; Lower Missouri valley, 84.0; Northern Pacific coast region, 85.4; Central Pacific coast region, 86.8; Southern Pacific coast region, 100.0. There were 117 omissions to predict (35 being due to the absence of reports from the Pacific coast) out of 3,444 or 3.40 per cent. Of the 3,327 predictions that have been made, 61, or 1.83 per cent, are considered to have entirely failed; 59, or 1.77 per cent, were one fourth verified; 342, or 10.28 per cent, were one-half verified; 464, or 13.95 per cent, were three-fourths verified; 2,401, or 72.17 per cent, were fully verified, so far as can be ascertained from the tri-daily reports.

Cautionary Signals.—113 Cautionary Signals were displayed during the month, of which 107, or 94.7 per cent, were fully justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of, the station. 73 Off-shore Signals were displayed, of which 69, or 94.5 per cent, were fully justified; 72, or 98.6 per cent, justified as to direction and 70, or 95.9 per cent, justified as to velocity. Forty-three of the Off-Shore were changed from Cautionary. 6 "Northwest" Signals displayed on the Lakes were all justified. 192 Signals of all kinds were displayed, of which 182, or 94.8 per cent, were fully justified. The above does not include signals ordered at display stations where the velocity is only estimated. Thirteen signals were ordered late.

The Northwest Signal referred to above was instituted by the following order:

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
WASHINGTON, D. C., November 18, 1880.

CIRCULAR.

On and after January 1, 1881, an additional Cautionary Storm Signal will be displayed, as occasion may require, at all active Signal and Display stations of the Signal Service on the Lakes. This signal will be displayed at and on the regular place and staff, and will consist of a *white flag with a black square in the centre*, shown above a *red flag with a black square in the centre* by day, or a *white light* shown above a *red light* by night. This signal will be known as the "CAUTIONARY NORTHWEST SIGNAL," and will indicate, when shown, that at the port or place where displayed it is anticipated that the winds will be dangerous, and will blow from the north or west or from a direction between these points. The display of this signal will generally follow, and must be distinguished from the display of the usual "Cautionary Signal," i. e., a red flag with a black square in the centre by day, or a red light shown at night, which retains, whenever shown, its usual meaning. *The display of either signal is always cautionary.* The "CAUTIONARY SIGNAL," i. e., a red flag with a black square in the centre by day, or a red light at night, calls for caution in view of an approaching storm, and is "CAUTIONARY" WITH REFERENCE TO WINDS BLOWING FROM ANY DIRECTION.

The "CAUTIONARY NORTHWEST SIGNAL," i. e., a white flag with a black square in the centre, shown above a red flag with a black square in the centre, by day, or a white light shown above a red light, by night, will indicate, when shown, that the storm disturbance is not considered as yet passed for the port or place where it is displayed, and that the winds

may yet be high, and the signal is "CAUTIONARY" WITH REFERENCE TO WINDS EXPECTED TO BLOW FROM THE NORTH OR WEST OR FROM A DIRECTION BETWEEN THOSE POINTS, at or near the place at which it may be displayed.

The order to display signals will be accompanied with a brief message giving the location and probable movement of storm-centre, the direction, and anticipated changes in the direction and force of the wind in the Lake region, and when practicable, for each Lake. The observers in charge of Signal stations on the Lakes, as well as all displaymen, will bulletin the order to display signals as well as the accompanying message, and any succeeding explanatory message, at such points as will secure the greatest publicity to the shipping interests, and will take any other steps that will ensure the greatest distribution to the parties interested in this information.

R. C. DRUM,
Adjutant General, and
Acting Chief Signal Officer of the Army.

NAVIGATION.

Stage of Water in Rivers.—In the table on the right-hand side of chart No. III are given the highest and lowest stages of water, as observed on the Signal Service river-gauges, during the month of February, 1881. With the exception of the Red River, in which the range, though considerable, was quite evenly distributed through the month, there have been very high and rapid rises in the navigable rivers. The Arkansas at Little Rock rose very rapidly from the 6th to 20th reaching its highest point on the latter date. The Mississippi at stations below St. Louis reached its maximum stage between the 24th and 28th; at Cairo, on the former date, the water reached a point 2 feet and 6 inches above the danger line. In the Ohio the highest stage was reached between the 11th and 17th, the water at Cincinnati rising 9 inches above the danger line on the 16th, and at Pittsburg 38 inches above on the 11th. The Cumberland at Nashville reached its highest stage on the 23rd and the Tennessee at Chattanooga on the 13th. At Morgantown and Pittsburg, on the Monongahela, the changes were rapid and very dangerous, the maximum stage being reached on the 10th and 11th. On the Pacific coast the navigable rivers north of San Francisco reached the highest stage of water between the 4th and 7th.

Ice in Rivers and Harbors.—The following items, relative to the formation of ice in such bodies of water throughout the northern section of the country, exhibit the same for the month of February, 1881. The Missouri and that portion of the Mississippi river from Keokuk northward have remained frozen during the month. At all Lake stations ice is reported firm and navigation closed. *Columbia River.*—Umatilla, Or., 1st to 4th, full of floating ice; 6th, free of ice, navigation resumed. *Umatilla River.*—Umatilla, Or., 1st to 4th, full of floating ice; 6th, free of ice. *Yellowstone River.*—Ft. Keogh, 28th, frozen over during month, but now threatening to break up. *Poerder River.*—Ft. Keogh, 28th, frozen over during month, but now threatening to break up. *Missouri River.*—Leavenworth, 6th, ice rising and cracking along banks; 7th, ice gorged; 8th, ice settled and again solid; 28th, ice 20 inches in thickness, teams crossing daily. *Kansas River.*—Lawrence, 7th, frozen over since November 18th, 1880; 8th to 16th, partly open; 17th to 28th, frozen over. *Des Moines River.*—Keokuk, 10th, river open to its mouth, ice gorged two-thirds the way across the Mississippi. *Mississippi River.*—Keokuk, 5th, to 26th, teams crossing on ice. St. Louis, 1st, ice gorged in Carondelet harbor; 3rd, ice solid above and below bridge, people crossing; 4th, one mile of gorge in Carondelet harbor moved out; 7th, river clear south of bridge; 8th, gorge above bridge, intact and covered with water; 9th, gorge gave way about noon, several boats damaged; 10th to 28th, river full of heavy floating ice; 15th, steamer "City of Granville" arrived from the south, first vessel since November 16th, 1880; 16th, ferries stopped by heavy floating ice. Dubuque, 28th, ice in river 32 inches in thickness. Cairo, 1st to 7th, river frozen over; 8th to 24th, full of floating ice; 14th, navigation resumed; 25th, entirely clear. Memphis, 14th, floating ice, water rising rapidly, endangering property. *Chicago River.*—Chicago, 9th, ice breaking up and passing out. *El River.*—Logansport, Ind., 6th, ice 22 to 25 inches thick; 10th, ice broke up and passed out, causing great destruction to bridges and other property. *Wabash River.*—Logansport, Ind., 10th, ice passed down river, occasionally interrupted by heavy gorges; the destruction to property almost without parallel. *St. Clair River.*—Port Huron, 9th, ice breaking up and passing down into St. Clair Flats. *Maumee River.*—Perrysburg, 9th, ice breaking up and forming heavy gorges; 10th, gorge broken, but formed at a point four miles below. Toledo, 11th, 7 p. m., ice gorged above city, 10 p. m., gorge broke, flooding a portion of city to the depth of several feet; six schooners loaded with wheat carried down by the ice through the railroad bridges, destroying a span of each bridge; 12th, gorged below city, backing up the water, flooding Water street to a depth of six feet, Island House and Lake Shore depot flooded, freight cars submerged, cellars filled, the water rising above the lower floors of dwellings, business entirely suspended; 14th, ice gorge intact, flood still continues, damage to property estimated at \$3,000,000. *Ohio River.*—Cincinnati, 1st to 15th, full of floating ice; 16th to 28th, clear. Vevay, Ind., 3rd, full of floating ice, great difficulty in landing, navigation suspended; 6th, full of heavy ice, no arrival of boats; 9th, large number of steamers passing southward, ice nearly disappeared; 11th, 12th, heavy ice, navigation suspended; 16th, ice rapidly disappearing, boats resumed trips. Louisville, 6th, river full of floating ice; 7th, mail boats stopped running; 8th, river clear. Portsmouth, Ohio, 2nd, heavy floating ice, navigation closed; 9th, navigation opened; 13th, heavy floating ice, navigation again closed; 15th, navigation open, river partially clear. *Cuyahoga River.*—Cleveland 9th, ice breaking up, but current not strong enough to carry it out to lake; 10th, gorged